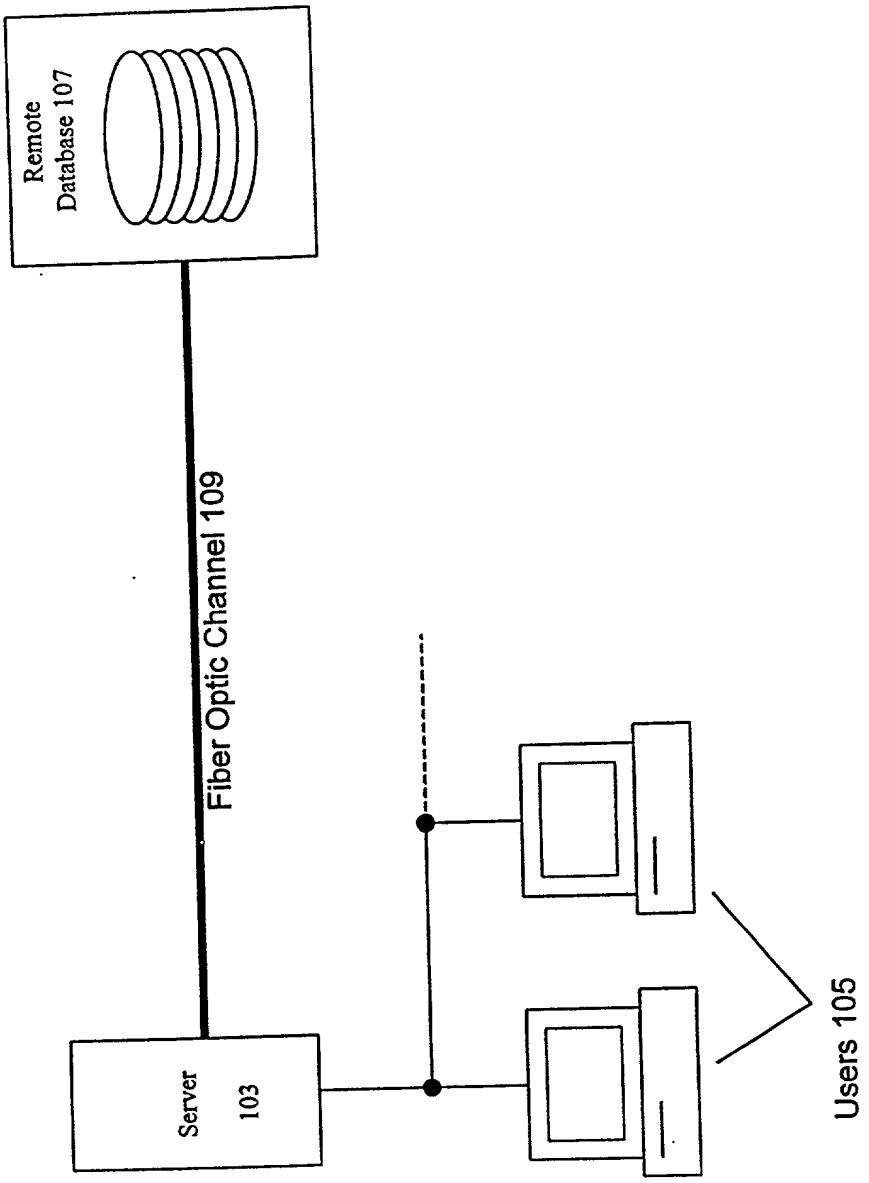

Remote Database 107
Fiber Optic Channel 109
Server 103
Users 105

Figure 1

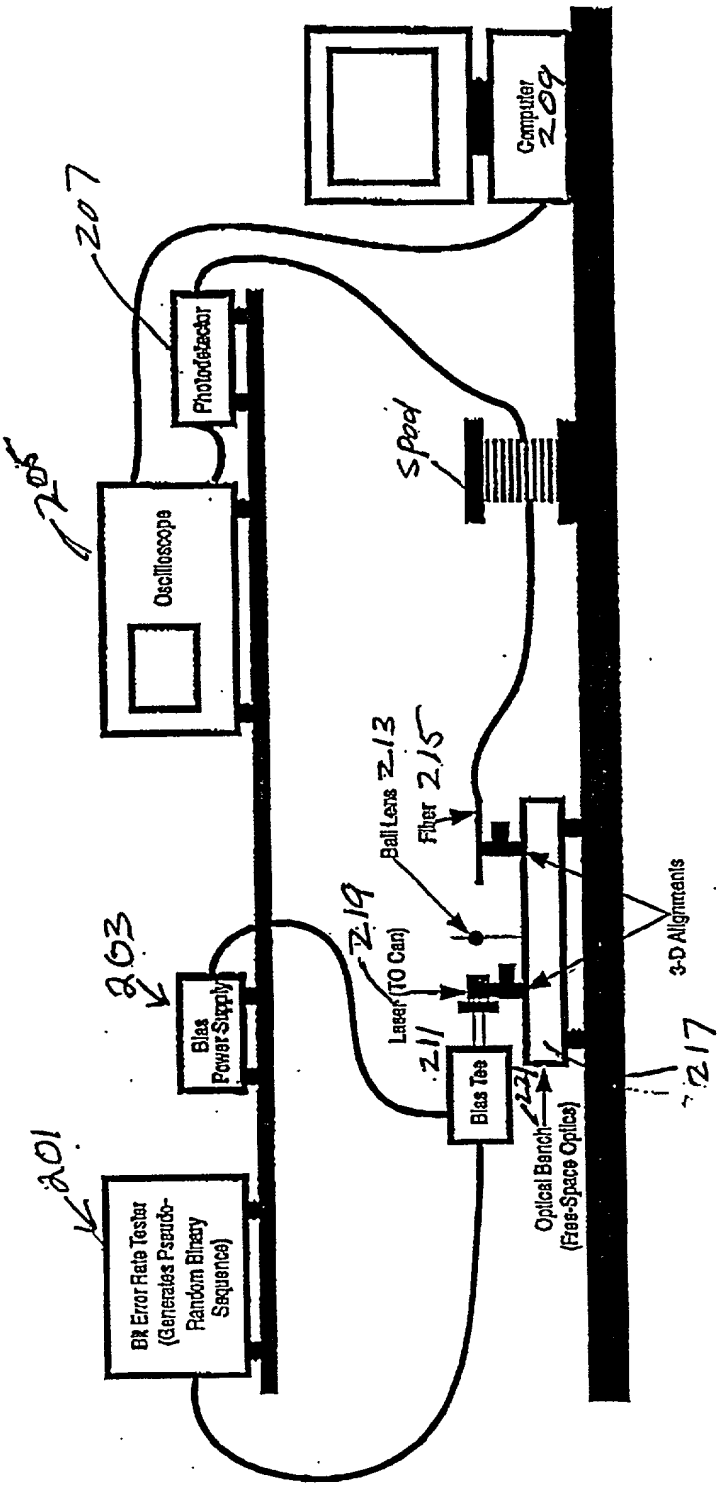

Computer 209
207
Photodetector
205
Oscilloscope
Spool
Ball Lens 213
Fiber 215
219
Laser (TO Can)
211
Bias Tee
221
Optical Bench (Free-Space Optics)
3-D Alignments
217
203
Bias Power Supply
201
Bit Error Rate Tester (Generates Pseudo-Random Binary Sequence)

Figure #2

FIBER	CORE DIAMETER[μm]	LENGTH[m]	MANUFACTURER
F0	62.5	270	Fujikura
F1	50.0	1152	Corning
F2	62.5	2234	Corning
F3	50.0	2247	Corning
F4	62.5	1151	Corning
F5	50.0	540	Corning

Figure #3

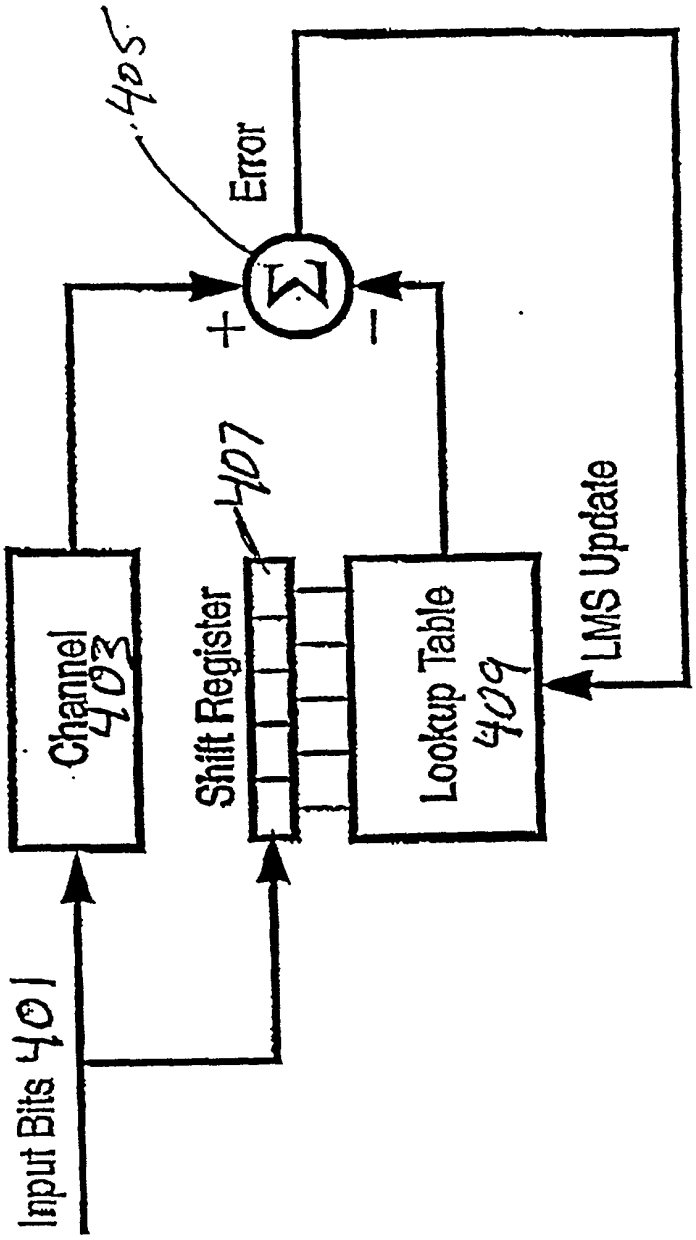
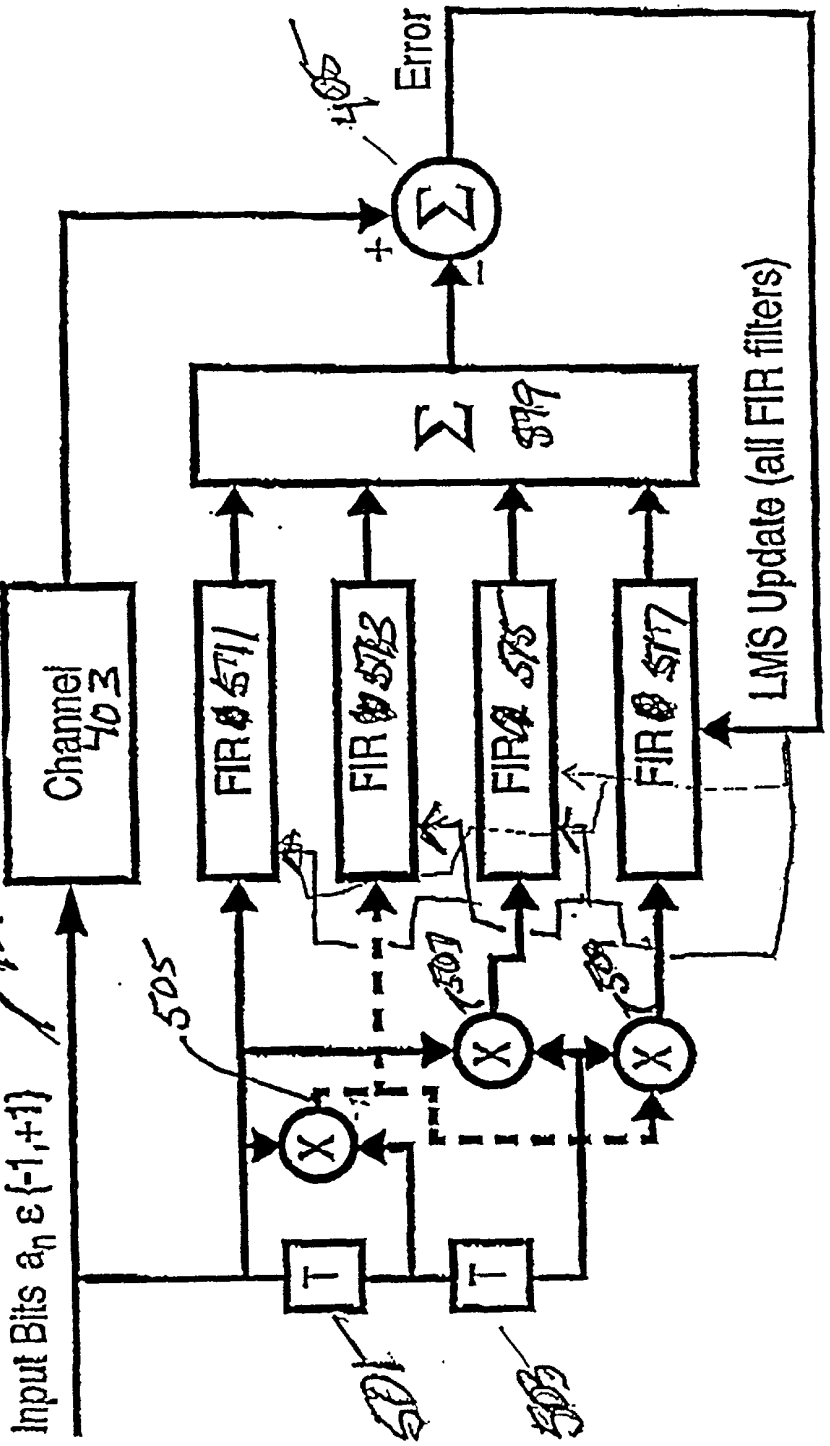

405
Error
Σ
+
−
407
Shift Register
Channel
403
Lookup Table
409
LMS Update
Input Bits 401

Figure 4



NOTE: This simplified diagram shows only four Volterra kernels, as with the data terms a_n, $a_n a_{n-1}$, $a_n a_{n-2}$, and $a_n a_{n-1} a_{n-2}$

Fig 5

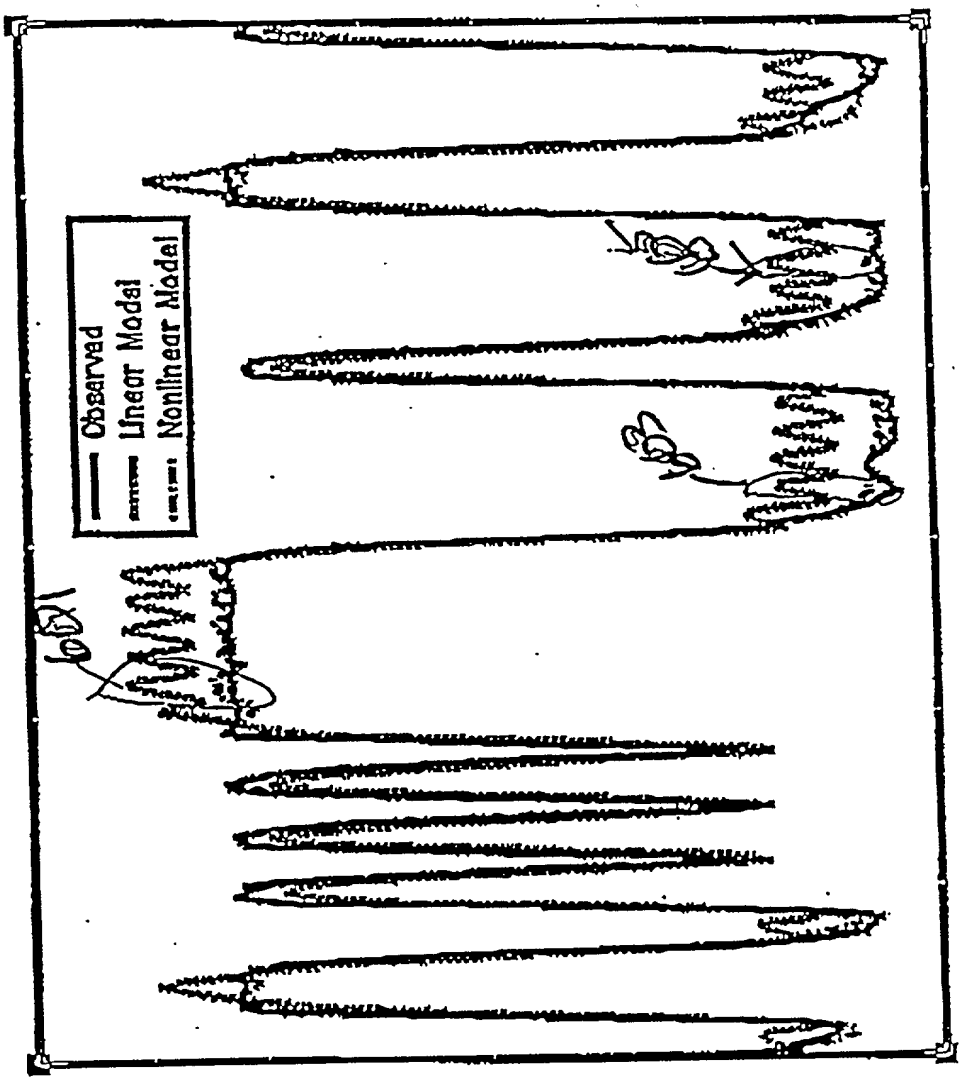


Fig 6

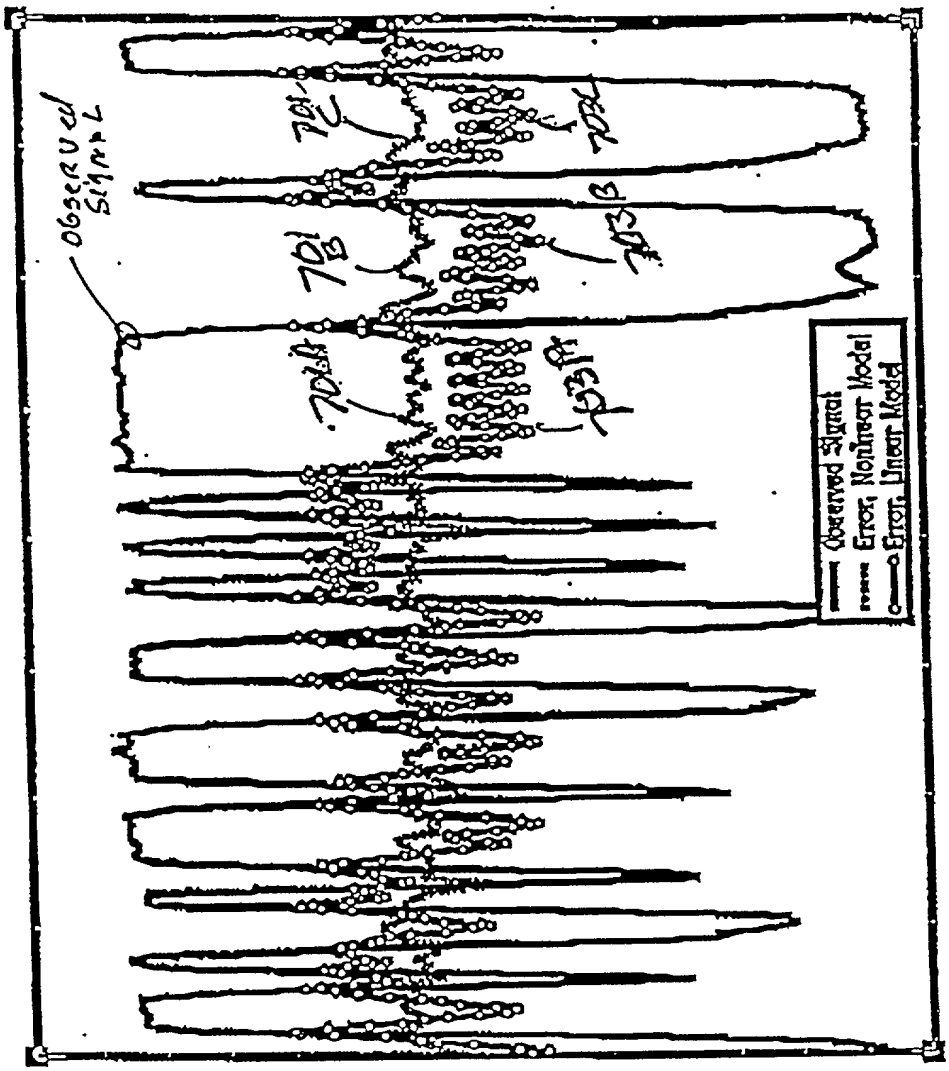


Figure 7

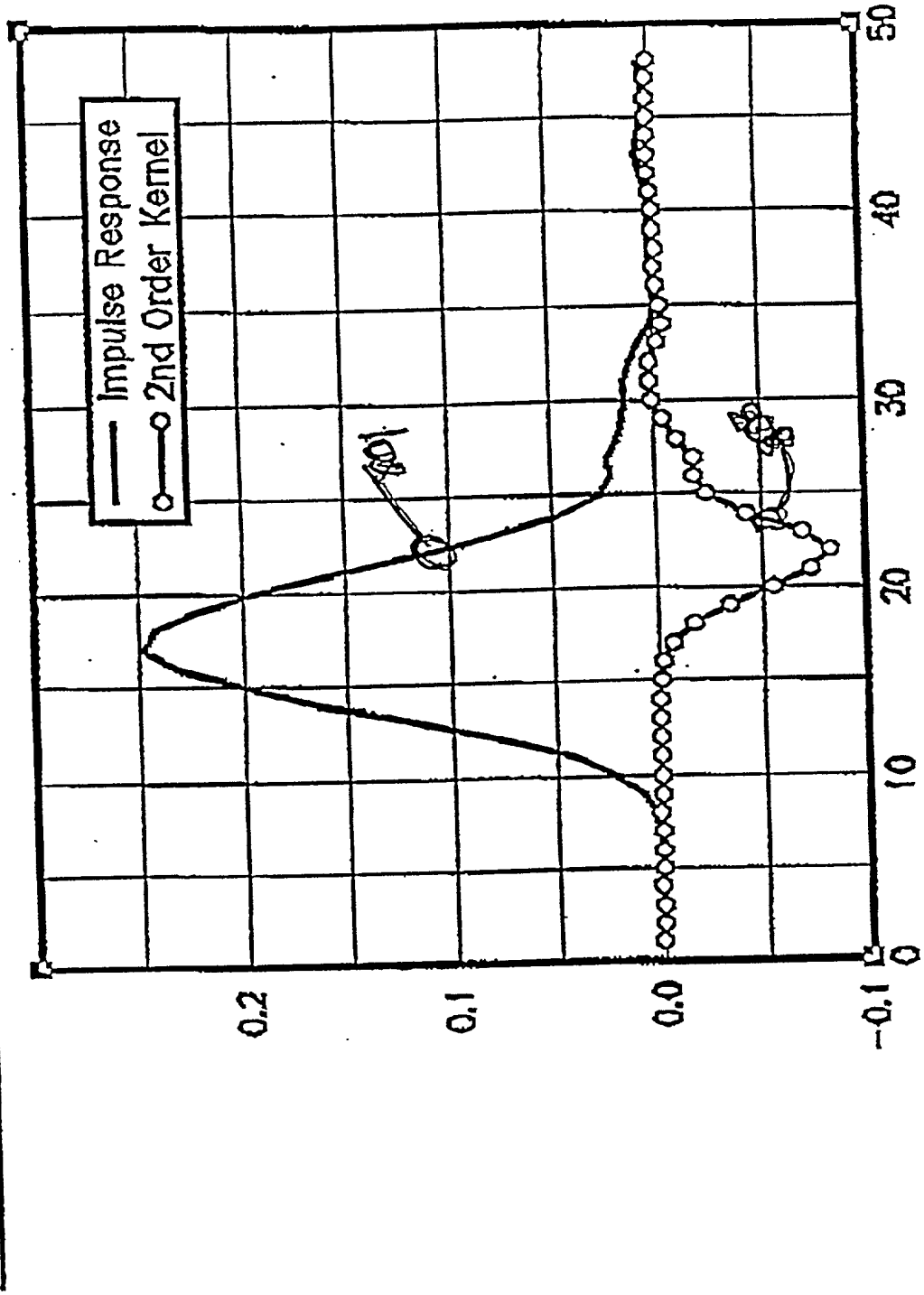


Figure 8

FIBER	SNR [dB] (linear model)	SNR [dB] (nonlinear model)
F0	12.8	23.2
F1	12.1	24.7
F2	13.4	24.9
F3	13.3	23.7
F4	12.4	23.8
F5	12.5	23.7

NOTE: SNR is defined as 10 $\log_{10}$(Signal Power/Error Power), and it does not necessarily coincide with the slicer SNR of a receiver

Figure 9

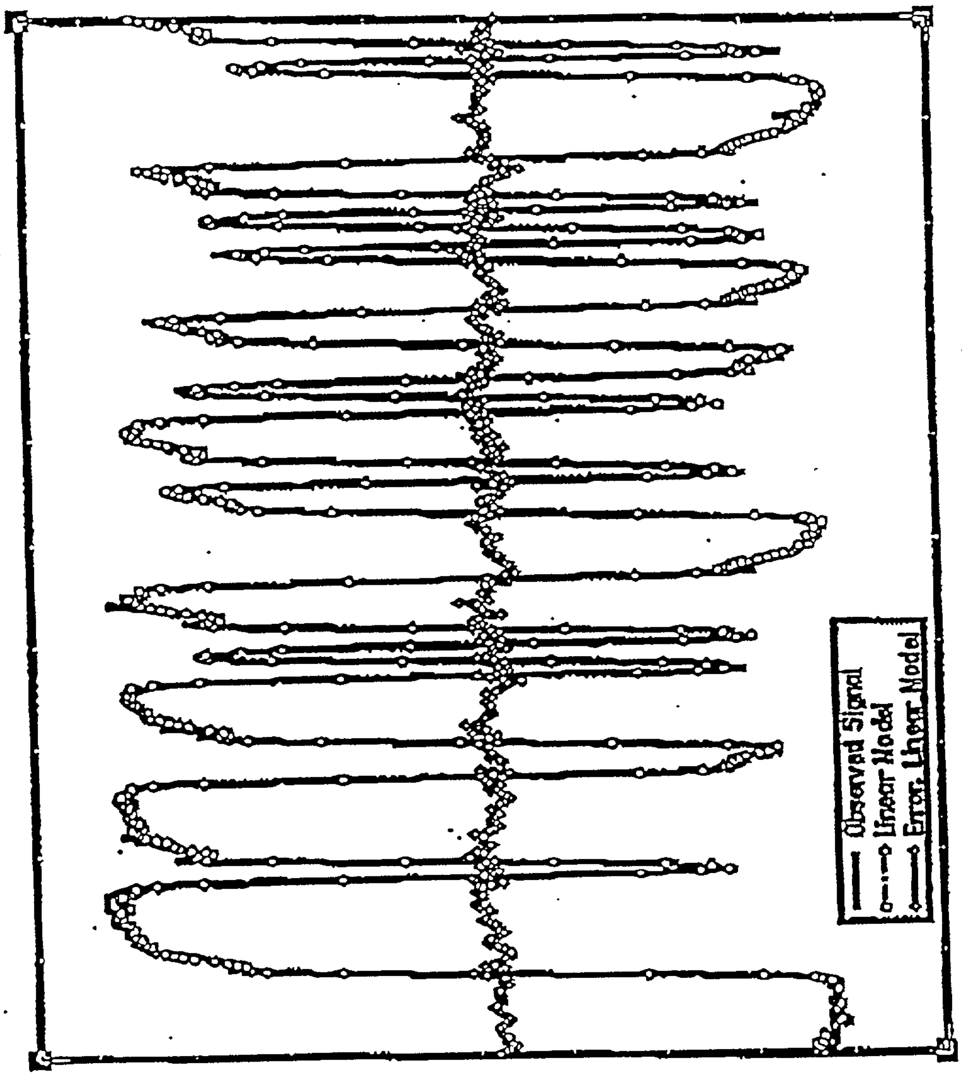


Figure 10

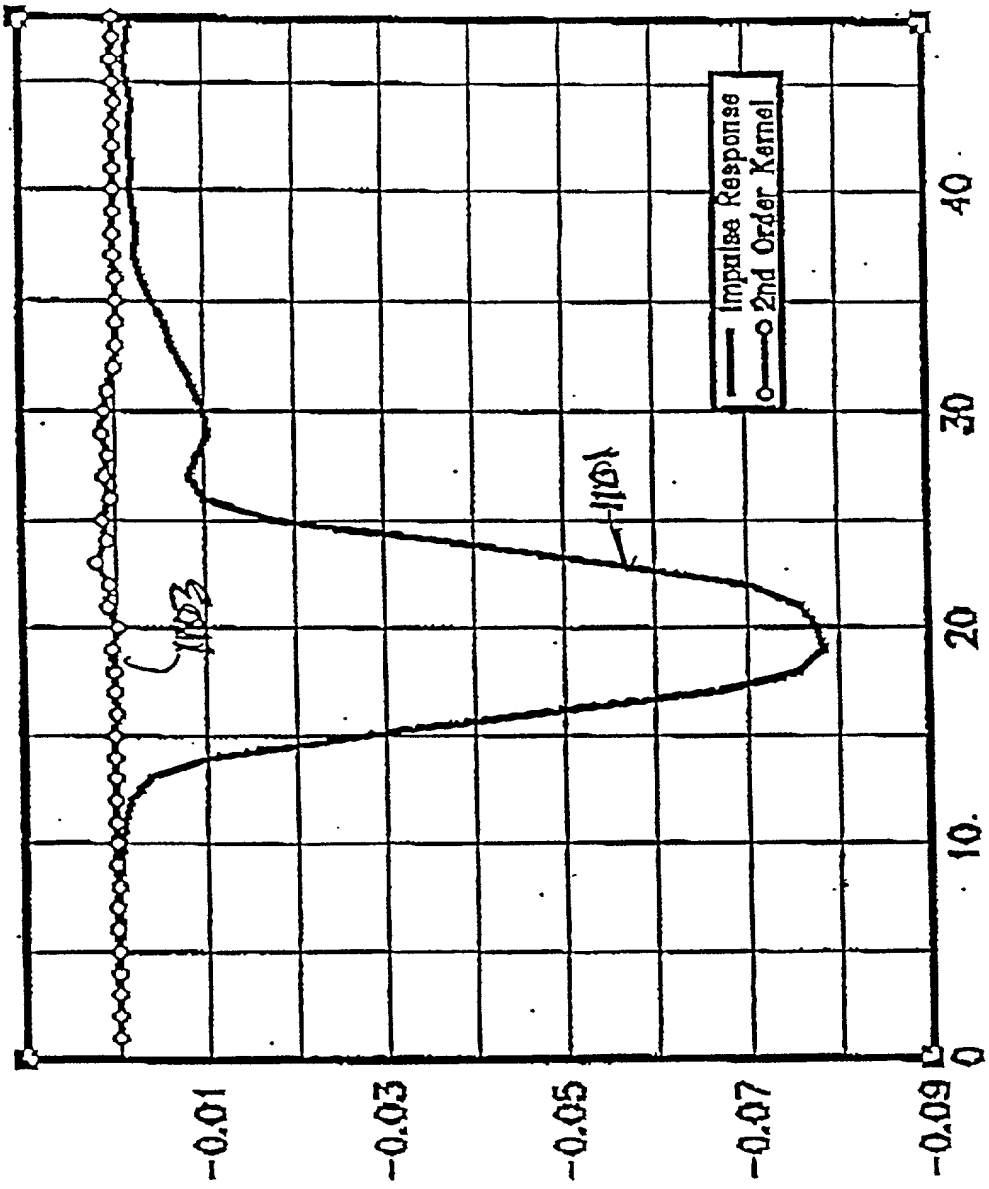

Impulse Response
2nd Order Kernel
-0.01
-0.03
-0.05
-0.07
-0.09
0
10.
20
30
40

Figure 11

FIBER	SNR[dB] (linear model)
F0	28.2
F1	26.6
F2	26.7
F3	27.4
F4	28.7
F5	28.2

NOTE: SNR is defined as $10 \log_{10}$(Signal Power/Error Power), and it does not necessarily coincide with the slicer SNR of a receiver

Figure 12

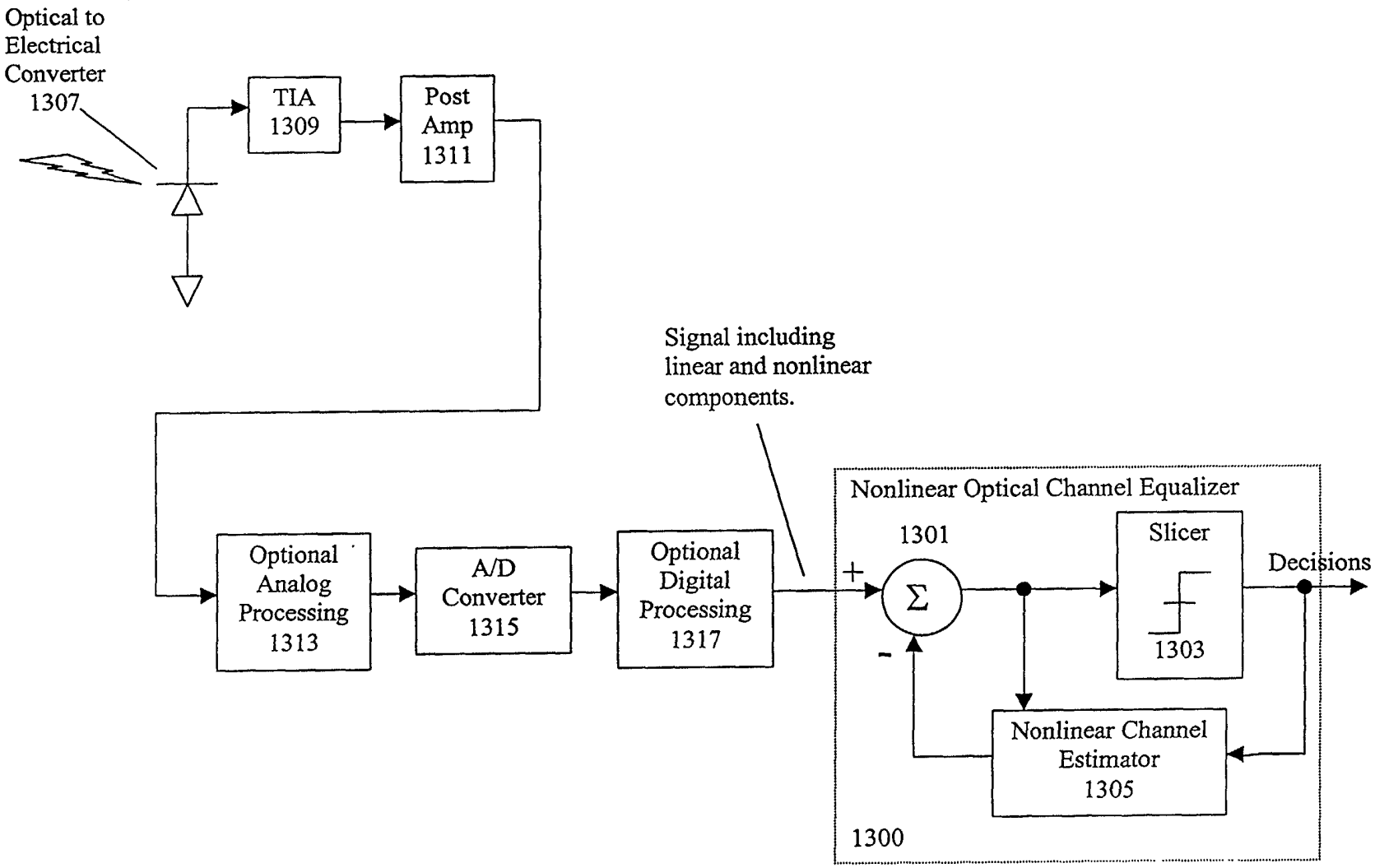

Optical to Electrical Converter 1307
TIA 1309
Post Amp 1311
Signal including linear and nonlinear components.
Optional Analog Processing 1313
A/D Converter 1315
Optional Digital Processing 1317
Nonlinear Optical Channel Equalizer
1301
+
Σ
-
Slicer
1303
Decisions
Nonlinear Channel Estimator 1305
1300

Figure 13

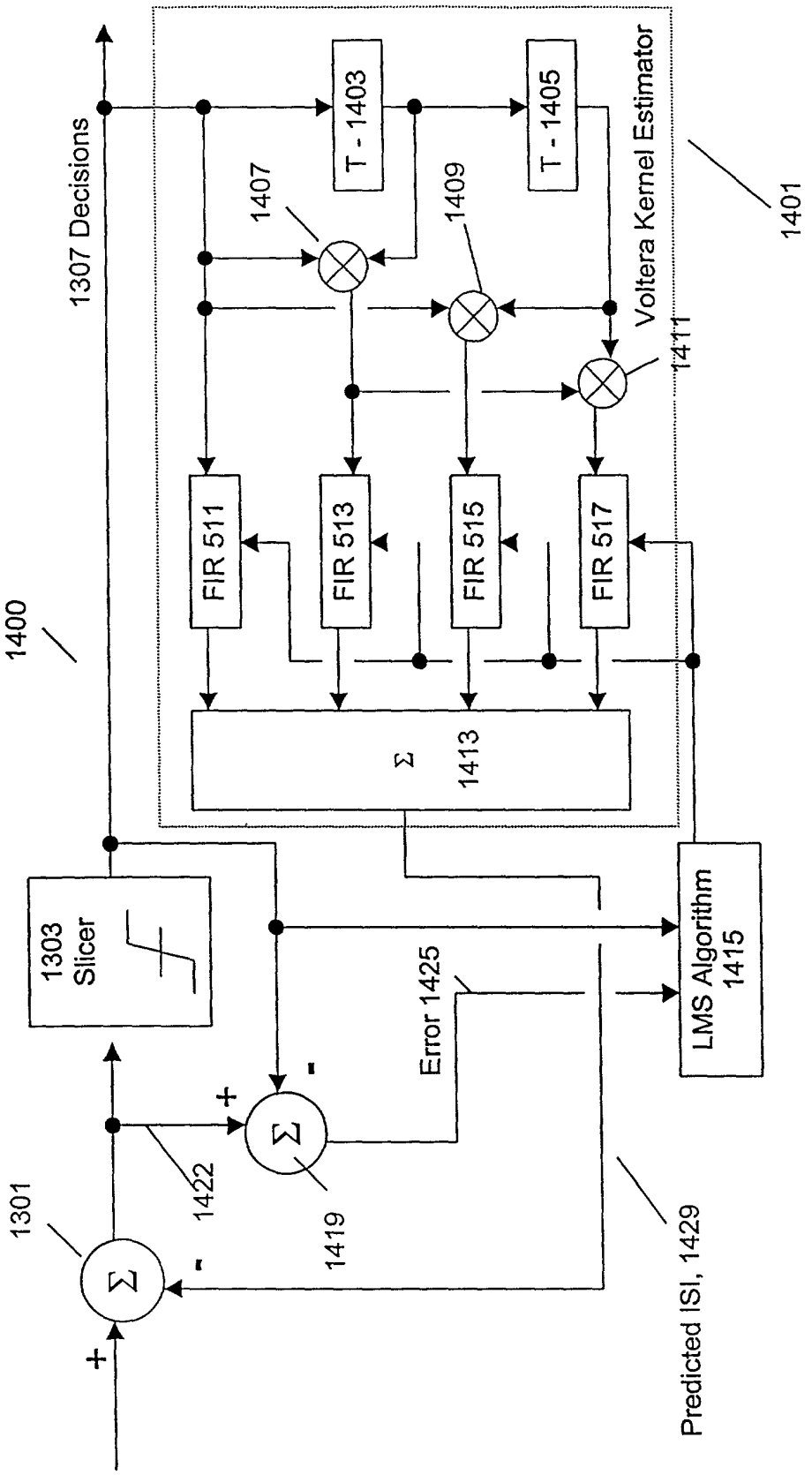

1307 Decisions
T - 1403
T - 1405
1407
1409
Voltera Kernel Estimator
1401
1411
FIR 511
FIR 513
FIR 515
FIR 517
1400
Σ
1413
1303 Slicer
LMS Algorithm 1415
Error 1425
1301
1422
1419
Predicted ISI, 1429

Figure 14A

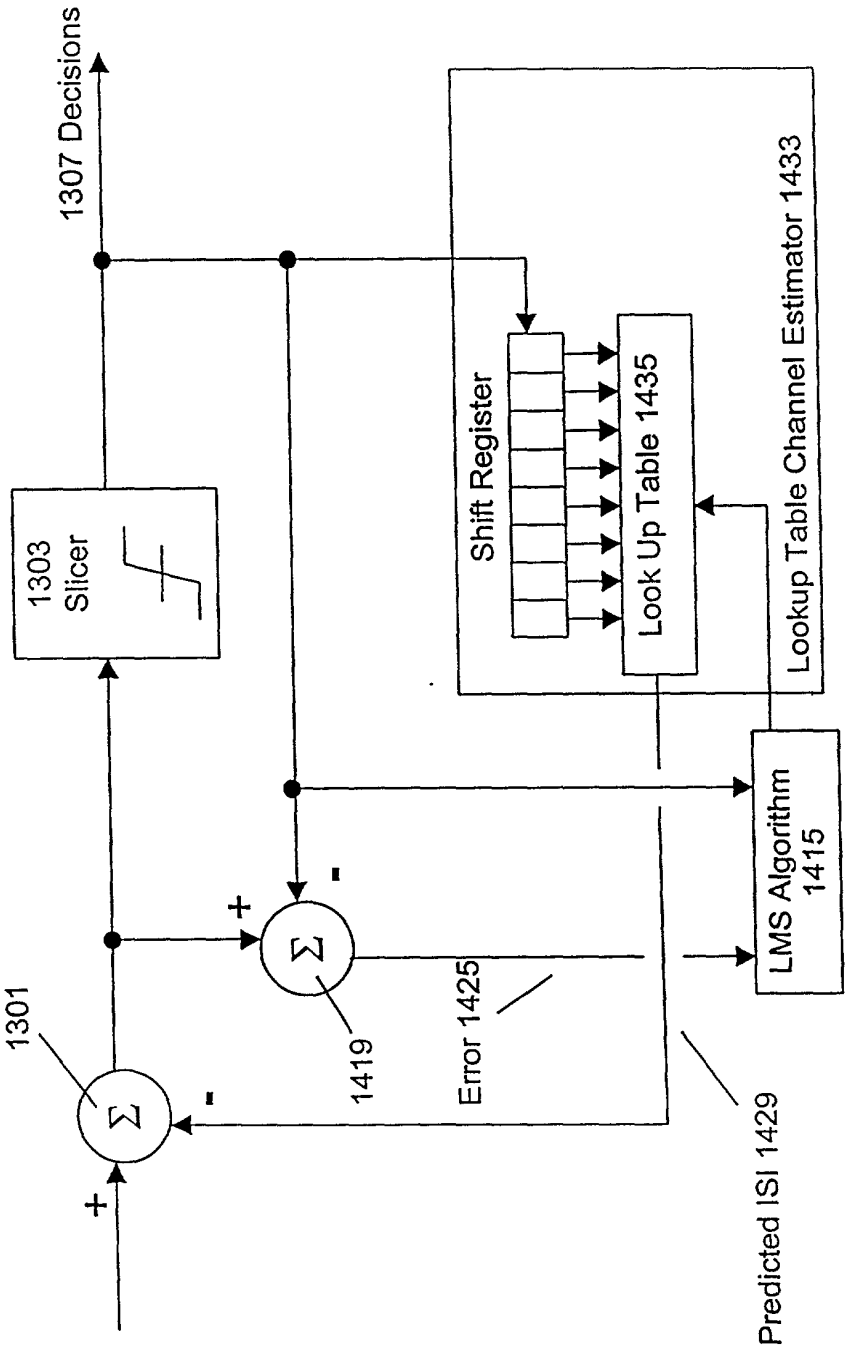

1307 Decisions
1303 Slicer
Shift Register
Look Up Table 1435
Lookup Table Channel Estimator 1433
LMS Algorithm 1415
1301
1419
Error 1425
Predicted ISI 1429
+
-
+
-
Σ
Σ

Figure 14B

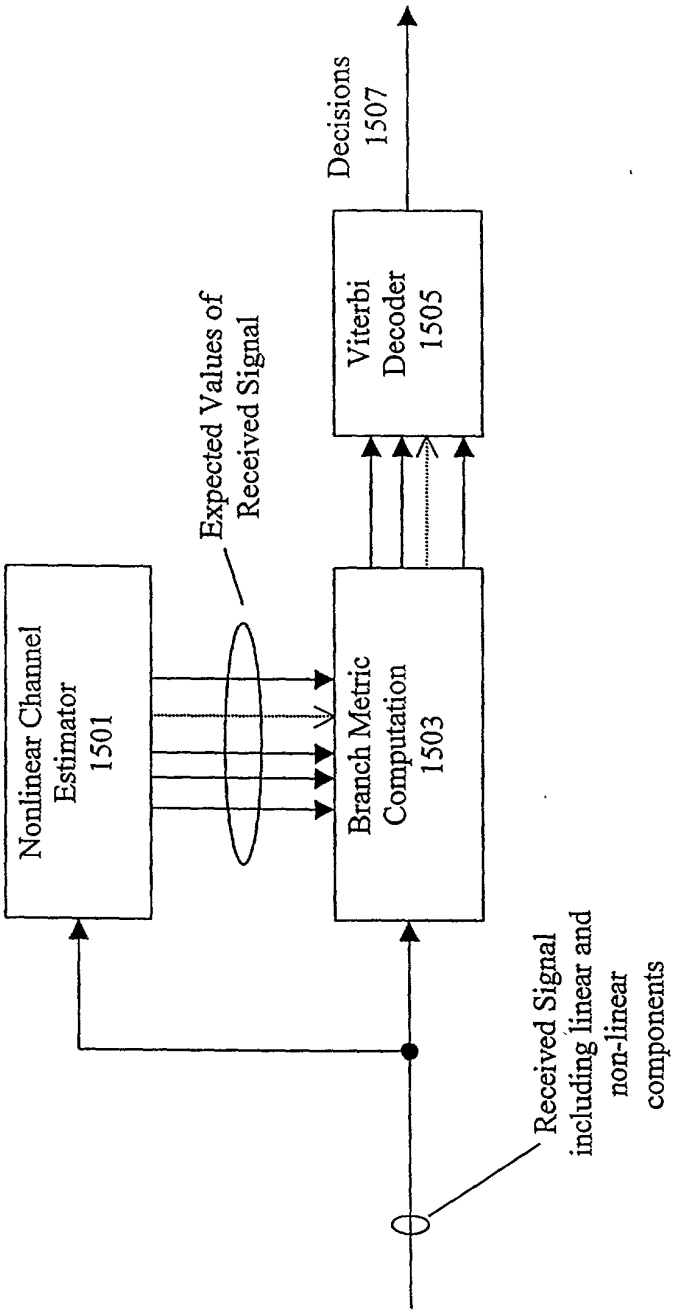

Nonlinear Channel Estimator 1501
Expected Values of Received Signal
Branch Metric Computation 1503
Viterbi Decoder 1505
Decisions 1507
Received Signal including linear and non-linear components

Figure 15